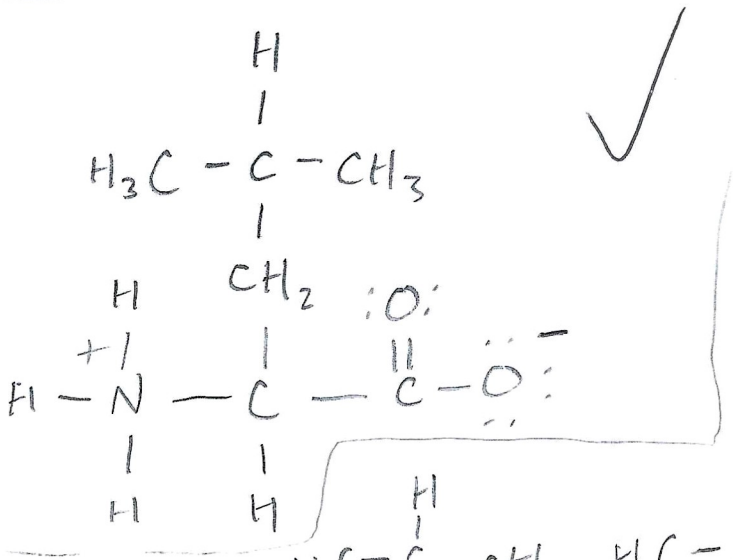
Quarterly Test #4

1. Zwitterion forms

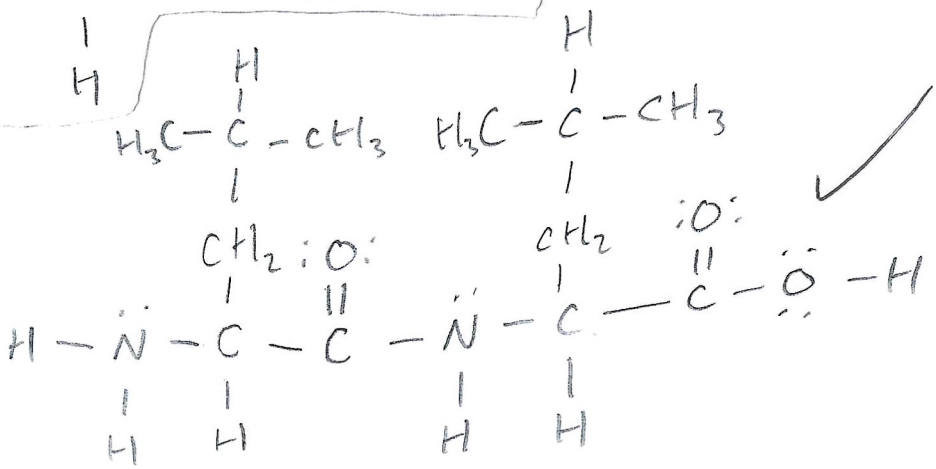


✓

23/26

88%

2.



✓

3. $2R\text{-}CHO + O_2 \xrightarrow[\Delta]{\text{catalyst}} 2R\text{-}COOH$ ✓

$R = CH_3$ to make $CH_3\text{-}COOH$

The reactant used to produce $CH_3\text{-}COOH$ is $CH_3\text{-}CHO$ ✓

4. Acetic Acid formula: $CH_3\text{-}COOH$

oxidized

$2R\text{-}CH_2\text{-}OH + O_2 \rightarrow 2R\text{-}CHO + 2H_2O$

Reactant used in the first step: $CH_3\text{-}CH_2\text{-}OH$ ✓

5. $R-CO_2H + HO-R' \rightarrow R-CO_2-R' + H_2O$

$R' = CH_3$

$R = CH_3$

$CH_3-CO_2H + HO-CH_3 \rightarrow CH_3-CO_2-CH_3 + H_2O$ ✓

6. $R-OH + HO-R' \xrightarrow{H_2SO_4} R-O-R' + H_2O$

$R' = CH_3-CH_2-CH_2$

$R = CH_3-CH_2-CH_2$

$CH_3-CH_2-CH_2-OH + HO-CH_2-CH_2-CH_3 \xrightarrow{H_2SO_4} CH_3-CH_2-CH_2-O-CH_2-CH_2-CH_3 + H_2O$ ✗ −1

7. There would be 6 water molecules produced in the process ✓

8. d. is a secondary alcohol ✓

9. b. could be made from the oxidation of a secondary alcohol ✓

10. a. could be made between two alcohols ✓

11. Pions are particles that are exchanged by nucleons in the nucleus ✓

12. The proton collided with an antiproton ✓

13. ^{200}Hg is more stable ✓

14. The nuclei are lighter than ^{56}Fe ✓

15. $E = mc^2$

$1.49 \times 10^{-11} = m(3.00 \times 10^8)^2$

$\frac{1.49 \times 10^{-11}}{9.00 \times 10^8} = m$

$m = 1.66 \times 10^{-28}\ kg$ ✓

$\left(\frac{1.66 \times 10^{-28}\ kg}{1}\right)\left(\frac{1\ amu}{1.6605 \times 10^{-27}\ kg}\right) = 0.100\ amu$

$6(1.0073) + 6(1.0087) = 12.0960$

$12.0960 - 0.100 = 11.996\ amu$ ✓

16. $3(1.0073) + 3(1.0087) = 6.0480$

$-\ 6.0136$

$= 0.0344\ amu$ ✓

$\left(\frac{0.0344\ amu}{1}\right)\left(\frac{1.6605 \times 10^{-27}\ kg}{1\ amu}\right) = 5.71 \times 10^{-29}\ kg$ ✓

$E = mc^2$

$E = (5.71 \times 10^{-29})(3.00 \times 10^8)^2$

$E = (5.71 \times 10^{-29})(9.00 \times 10^8) = 5.14 \times 10^{-12}\ J$ ✓

Binding Energy

17. ${}^{3}_{1}H \rightarrow {}^{3}_{2}He + {}^{0}_{-1}e + {}^{0}_{0}\bar{\nu}$ ✓ daughter product? ${}^{3}_{-1}He$

18. ${}^{238}_{92}U \rightarrow {}^{234}_{90}Th + {}^{4}_{2}He$ ✓ daughter product? ${}^{234}_{\ 90}Th$

19. $N = 150g\left(\frac{1}{2}\right)^{\frac{36.3}{12.1}} \Rightarrow N = 150g\left(\frac{1}{2}\right)^3 \Rightarrow N = \frac{150g}{8}$

$= 18.75g$ ✓

20.

$K \cdot 12.1 = \frac{0.693}{K} \cdot K$

$\frac{12.1K}{12.1} = \frac{0.693}{12.1}$

$K = 0.0573$ half days ✓

$N = (150.0)(e^{-((0.0573)(50.0))})$

$N = 150.0\,(e^{-2.865})$ ✓

$= 8.5$ grams ✓